National Transportation Safety Board
Aviation Accident Final Report

Location:	DORCHESTER, NH	**Accident Number:**	NYC97FA194
Date & Time:	12/24/1996, 1005 EST	**Registration:**	N388LS
Aircraft:	Learjet 35A	**Aircraft Damage:**	Destroyed
Defining Event:		**Injuries:**	2 Fatal
Flight Conducted Under:	Part 91: General Aviation - Positioning		

Analysis

The first officer was in the left seat, flying the airplane, and the captain was in the right seat, for the positioning flight. Approaching the destination, the crew briefed, then attempted an ILS RWY 18 approach. The captain reported not receiving the localizer, when, in fact, the airplane was actually about 5 nautical miles to the left of it. Winds at the airport, about that time, were from 190 degrees true, at 5 knots; however, area winds at 6,000 feet were from 220 degrees, in excess of 40 knots. The crew executed a missed approach, but did not follow the missed approach procedures. The captain later requested, and received clearance for, the VOR RWY 25 approach. The captain partially briefed the approach to the first officer as the airplane neared the VOR, then subsequently "talked through" remaining phases of the approach as they occurred. The outbound course for the VOR RWY 25 approach was 066 degrees, and the minimum altitude outbound was 4,300 feet. After passing the VOR, the captain directed the first officer to maintain 4,700 feet. The airplane's last radar contact occurred as the airplane was proceeding outbound, 7 nautical miles northeast of the VOR, at 4,800 feet. As the airplane approached the course reversal portion of the procedure turn, the captain initially directed the first officer to turn the airplane in the wrong direction. When the proper heading was finally given, the airplane had been outbound for about 2 minutes. During the outbound portion of the course reversal, the captain told the first officer to descend the airplane to 2,900 feet, although the procedure called for the airplane to maintain a minimum of 4,300 feet until joining the inbound course to the VOR. During the inbound portion of the course reversal, the captain amended the altitude to 3,000 feet. As the airplane neared the inbound course to the VOR, the captain called out the outer marker. The first officer agreed, and the captain stated that they could descend to 2,300 feet. The first officer then noted that the VOR indications were fluctuating. The captain pointed out the VOR's continued reception, and the first officer noted, "but it's all over the place." Shortly thereafter, the first officer stated that he was descending the airplane to 2,300 feet. Three seconds later, the airplane impacted trees, then terrain. The wreckage was located at the 2,300-foot level, on rising mountainous terrain, 061 degrees magnetic, 12.5 nautical miles from the VOR. It was also 10.3 nautical miles prior to where a descent to 2,300 feet was authorized. There was no evidence that the crew used available DME information. There was also no evidence of pre-impact mechanical malfunction.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: The captain's failure to maintain situational awareness, which resulted in the airplane being outside the confines of the instrument approach; and the crew's misinterpretation of a step-down fix passage, which resulted in an early descent into rising terrain. Factors included the captain's misreading of the instrument approach procedure, the crew's rushed and incomplete instrument approach briefing, their failure to use additional, available navigational aids, and their failure to account for the winds at altitude.

Findings

Occurrence #1: IN FLIGHT COLLISION WITH TERRAIN/WATER
Phase of Operation: APPROACH - IAF TO FAF/OUTER MARKER (IFR)

Findings
1. (C) BECAME LOST/DISORIENTED - PILOT IN COMMAND
2. (C) NAVAID SIGNAL - MISJUDGED - FLIGHTCREW
3. DESCENT - PREMATURE - FLIGHTCREW
4. (F) IFR PROCEDURE - MISREAD - PILOT IN COMMAND
5. (F) CREW/GROUP BRIEFING - INADEQUATE - FLIGHTCREW
6. (F) SELF-INDUCED PRESSURE - FLIGHTCREW
7. (F) COMPENSATION FOR WIND CONDITIONS - NOT USED - FLIGHTCREW
8. (F) IMPROPER USE OF EQUIPMENT/AIRCRAFT - FLIGHTCREW

Factual Information

HISTORY OF FLIGHT

On December 24, 1996, at 1005 Eastern Standard Time, a Learjet 35A, N388LS, operated by Aircraft Charter Group Inc., was destroyed when it impacted terrain near Dorchester, New Hampshire. At the time of the accident, the airplane was in instrument meteorological conditions, conducting an instrument approach to the Lebanon Municipal Airport (LEB), Lebanon, New Hampshire. The captain and the first officer, both of whom were certificated airline transport pilots, were fatally injured. An instrument flight rules flight plan had been filed for the flight, from Igor I. Sikorsky Memorial Airport (BDR), Bridgeport, Connecticut, to Lebanon. The positioning flight was conducted under 14 CFR Part 91.

A sequence of events was derived from Boston Air Route Traffic Control Center (ARTCC) communications transcripts, Lebanon Tower communications transcripts, the airplane's cockpit voice recorder (CVR), and radar/transponder beacon information, which was incorporated into a Safety Board Recorded Radar Study. Timelines provided in the tower transcripts lagged those of the center by 22 to 27 seconds. In addition, there were occasional, slight discrepancies between center and CVR timelines (1 second), due to transcription differences.

The flight departed Bridgeport at 0919. The captain was in the right seat, and the first officer was in the left seat, flying the airplane. The airplane climbed to flight level 190 per instructions, and then was gradually "stepped down" to 7,000 feet as it neared Lebanon.

At 0927:04, the center controller cleared the flight to proceed direct, to Lebanon. About 10 minutes later, the captain copied the ATIS information, then read part of it back to the first officer, and said, "doing the i-l-s approach." At 0937:53, the captain stated to the first officer, "you wanna review this and i'll take the airplane if you like." The first officer responded with, "yeah i will. you can have the airplane." Exactly when control of the airplane was passed back to the first officer, was not determined. At 0938:44, there was an unintelligible conversation, followed, shortly thereafter, by one of the pilots, which one, being unknown, stating, "yeah, we're set up on eleven nine."

According to the instrument approach procedure, the ILS RWY 18 approach frequency at Lebanon was 111.9 mhz.

At 0939:40, the first officer called for the approach checklist, and the captain responded with the approach items, followed by, "okay, approach set up is complete." At 0941:28, the captain confirmed with the center controller that the crew had weather "information hotel" for Lebanon. At 0945:10, the crew was instructed to maintain a heading of 050 degrees magnetic, and at 0946:06, they were issued a descent from 7,000 feet to 4,700 feet. At 0946:14, the controller stated, "lear eight lima sierra...once you leave five thousand proceed direct burgr for the i-l-s approach," which was acknowledged by the captain.

According to the radar data, the airplane was about 1 nautical mile southwest of the Lebanon VOR, heading northeast, at that time.

The Lebanon VOR was located 066 degrees magnetic, 4.4 nautical miles from the approach end of Runway 25 at Lebanon Airport. According to the ILS RWY 18 approach procedure, BURGR intersection was identified as an outer marker on the localizer, and was also 6 nautical

miles from the Lebanon VOR, on its 317-degree radial.

At 0947:21, the airplane was about 3 nautical miles northeast of the Lebanon VOR, descending through 5,500 feet. About that time, the center controller radioed: "and eight eight lima sierra, maintain four thousand seven hundred until established on a portion of the approach, cleared i-l-s approach lebanon." The captain acknowledged both the altitude and the approach clearance, and shortly thereafter, the crew configured the airplane to "flaps eight."

According to the radar data, the airplane continued to the northeast, until the last outbound radar contact, at 0947:45. At the time, the airplane was at 4,900 feet.

At 0948:35, the controller told the crew that radar service was terminated, and to contact Lebanon Tower.

At 0948:52, the captain contacted the Lebanon Tower controller, and reported, "...with you i-l-s one eight inbound, seven out outside of burgr." The tower controller then reported that, "weather remains basically the same. winds are one niner zero at seven now. altimeter two niner eight three." The captain acknowledged the call, then asked if the airplane was cleared to land. The tower controller told him to report BURGR inbound.

At 0948:57, radar contact was regained, northwest of the last contact, consistent with the airplane having made a left, teardrop turn. Subsequent radar returns indicated that the airplane then headed southwest. At 0949:57, the airplane was at 4,700 feet, and about 11 nautical miles northeast of Lebanon Airport.

At 0949:58, the captain stated to the first officer, "well, i was looking at the ah airport thinking that it was eight miles." The first officer then discussed the amount of flaps deployed, and the captain asked, "you want 'em up?" The first officer said that he did, and right after, at 0950:17, the captain said, "four thousand seven hundred...." Shortly thereafter, he said, "let's get some speed up here."

At 0950:41, the first officer stated, "okay, localizer's coming alive," then, "localizer's alive."

At 0950:55, the captain stated to the first officer, "what's up with this...," and the first officer then asked, at 0951:16, "tuned and identified, right?" The captain did not answer the question, but at 0951:20, said, "we're not getting a localizer here." At 0951:21, the captain reported to the tower, "...we're burgr inbound we're not getting a localizer."

Radar data revealed that the airplane was not at BURGR at that time, but was about 5 nautical miles to the southeast of it, heading southwest.

At 0951:29, the tower controller asked if the crew was going to continue the approach or execute a missed approach from that position, and reported that the localizer was "in the green." The captain answered back, "roger." The captain then told the first officer to descend to 3,500 feet. The first officer asked for flaps eight, and the captain answered, "going to eight." At 0952:07, the captain stated, "all right, we've missed, execute missed approach," to which the first officer responded, "okay."

At 0952:09, the tower controller asked for the crew's intentions. The captain responded that they were going to execute the missed approach, and, "we're not receiving the localizer." Six seconds later, at 0952:18, the controller said, "roger."

The published missed approach for the ILS RWY 18 approach was: "Climb to 2000', then climbing RIGHT turn to 4800' direct IVV NDB and hold." The IVV NDB was the White River

NDB, which was located about 8 nautical miles southwest of the Lebanon Airport, with a frequency of 379 khz.

At 0952:20, the captain said to the first officer, "missed approach," then told him to "climb to two thousand turn forty eight hundred, direct to the n-d-b." The first officer responded, "all right", and the captain then said, "set three seventy nine, i'll put that in there." At 0952:28, the tower controller told the crew to execute the "...published missed approach, contact boston center...."

According to the radar data, at that time, the airplane was about 2 nautical miles southeast of the VOR, proceeding southeast, at approximately 4,500 feet.

At 0952:36, the first officer called for "flaps up," and the captain responded with, "flaps up." The first officer then asked, "what's the altitude you want me to go to," to which, the captain first answered, "just climb," then said right after that, "forty seven hundred." At 0952:50, the captain reported to Boston Center that the airplane was "on the missed." The center controller asked for the crew's intentions, and the captain responded with a request for a confirmation that the localizer frequency was 111.9 mhz. The center controller told the captain that he'd check on it, but to fly the "published missed procedure," and maintain 5,000 feet. At 0953:24, the captain acknowledged the instructions to fly the published missed approach procedure at 5,000 feet.

According to the radar data, the airplane climbed to 5,000 feet shortly after being cleared to that altitude. However, it did not make a turn to the right, to proceed to the White River NDB, per the published missed approach instructions. Instead, it continued heading to the southeast.

At 0953:27, the first officer stated, "this ah this ah i'm not even getting an a-d-f." Seven seconds later, the captain responded with, "here you go."

At 0953:35, the center controller confirmed that the localizer frequency had been 111.9 mhz, and the captain reiterated that the crew was unable to receive it. At 0953:50, the captain requested the VOR RWY 25 approach with "circle to land." The controller approved the request, and then, at 0954:19, cleared the airplane to proceed directly to the VOR.

According to the radar data, at that time, the airplane was about 9 nautical miles southeast of the Lebanon VOR. The airplane made a right turn from that position, and headed back toward the northwest.

According to the VOR or GPS RWY 25 approach procedure in effect at the time, the outbound course from the VOR was 066 degrees magnetic, with a descent down to a minimum of 4,300 feet above mean sea level. The procedure turn was to be completed within 10 nautical miles of the VOR. The published course reversal for the procedure turn included an initial left turn to a heading of 021 degrees magnetic, followed by a right turn to a heading of 201 degrees magnetic, until joining an inbound course to the VOR of 246 degrees magnetic. After joining the inbound course, the approach called for a descent to a minimum of 2,900 feet, until the Hanover NDB/marker beacon, which was on the inbound course, 2.2 nautical miles northeast of the VOR. Upon reaching Hanover, a descent to a minimum of 2,300 feet was authorized, until after passing the VOR. At that time, a descent to the published minimum descent altitude could be made. The Lebanon VOR operating frequency was 113.7 mhz and the Hanover NDB operating frequency was 276 khz.

At 0954:24, the captain stated to the first officer, "well let me set you up here. same thing lebanon. three oh four." At 0955:07, the airplane was cleared to cross the Lebanon VOR at or above 4,700 feet, then cleared for the VOR RWY 25 approach. At 0955:19, the captain stated, "three fourteen." The first officer responded with, "no problem.... i'm gonna go outbound on the zero six six radial and...here." At 0955:52, the captain stated: "three one eight," then repeated it twice more. At 0956:04, the captain stated, "let me get rid of this thing," and shortly thereafter, stated, "it'll probably make things easier for you." At 0956:16, the captain said, "i'll take our time outbound," and at 0957:08, stated, "okay that's gonna be our outbound zero zero six. go off lebanon."

At 0957:43, the center controller stated, "...radar service is terminated contact lebanon tower now one two five point niner five." The captain rogered, and contacted Lebanon Tower, "on the v-o-r two five circle to land one eight." The tower controller then requested the airplane's position, and at 0958:07, the captain answered back, "...we're ah five miles to the ah southeast of the v-o-r."

According to the radar data, when the captain called the 5 miles, the airplane was about 5 nautical miles to the southeast of the VOR.

The tower controller then told the crew to report "v-o-r outbound." He also stated, "...i'll give you a wind check ah in the vicinity of the v-o-r inbound. winds are currently two three zero at five...." He then gave them the option to land on Runway 25 instead of Runway 18, which they accepted.

At 0958:41, the first officer called, "over station passage." However, at that time, the airplane was about 2 nautical miles south of the Lebanon VOR, inbound. The captain immediately responded with, "yeah...this is the airport that's the v-o-r. they're not on the field." The first officer responded with, "oh, I see," and the captain continued with: "...just to let you know."

At 0958:47, the first officer stated, "i might as well start turning now," and 1 second later, asked: "zero zero six?" At 0959:39, the captain stated, "all right now, inbound heading is two forty six. keep...on the turn." At 0959:46, the first officer asked, "two forty six?" and the captain responded, "the inbound. remember we've got to go outbound." The first officer then said, "yeah." At 0959:52, the captain called, "okay, station passage, time is set."

According to the radar data, when the captain called station passage, the airplane had just passed over the VOR.

At 0959:55, the captain reported, over the radio, "...v-o-r outbound," and the controller requested that they report the VOR inbound. The first officer then asked the captain, "down to what alt?", and the captain responded, at 1000:04, with "zero six six outbound..." At 1000:09, the first officer said, "okay and ah," but the captain cut in at 1000:10 with, "let's go zero six six. grab it. let's go," and the first officer responded with, "zero six six."

At 1000:17, the tower controller transmitted, "go ahead maintenance." At 1000:19, the first officer asked, "altitude?", and the captain responded, "four thousand seven hundred. At 1000:27, the tower controller transmitted, over the radio, "maintenance roger." The captain commented to the first officer, "well they're fixing the i-l-s," and the first officer responded, "you bet your...."

At 1000:42, the first officer said: "okay time it," and the captain answered, "okay...let's just track back. we have plenty of time. let's just intercept that." Seventeen seconds later, the

captain said, "take a big cut into that." At 1001:19, the captain stated, "needle's coming alive." The first officer acknowledged, then the captain stated, "go to a heading of two two one." He repeated the heading of "two two one" 12 seconds later, and told the first officer to "get it around." At 1001:49, the first officer stated, "two two one. altitude?" At 1001:53, the captain said, "no, zero two one. zero two one for one minute," to which, the first officer acknowledged.

Elapsed time between the captain calling station passage, and his calling out the corrected course reversal heading, was about 2 minutes.

The last recorded radar data for the flight, at 1001:47, indicated that the airplane was about 7 nautical miles northeast of the Lebanon VOR, at 4,800 feet. The average groundspeed outbound was about 230 knots, and the airplane was proceeding along an east, northeasterly ground track.

At 1002:04, the captain stated, to the first officer, "...we stay at this altitude until we intercept. then we go down to twenty nine hundred." This was followed at 1002:10, by the captain saying, "we can go down to twenty nine now."

At 1002:17, the first officer asked, "right turn or left turn to ah two two one?" At 1002:19, the captain told him it would be a right turn. At 1002:23, the captain said, "two forty six on that...you go to two oh one," which the first officer acknowledged. At 1002:26, the captain stated, "okay and intercept that." The first officer then asked, "and make a right turn in to intercept?" The captain confirmed, "a right turn," and at 1002:32, the first officer stated, "oh okay."

The elapsed time between the captain calling station passage, and the first officer's last acknowledgment of the right turn to 221 degrees, was 2 minutes, 40 seconds.

At 1002:38, the captain stated, "...approach flaps." At 1002:40, the first officer said, "let me know ah time," and the captain responded with, "'kay you got about fifteen seconds."

At 1002:56, the first officer stated, "twenty nine," and at 1003:06, the captain stated, "okay let's turn. maintain three thousand. let's maintain three." The first officer acknowledged the three thousand feet, then, at 1003:15, the captain said, "let's put thirty degrees of bank in there...intercept." The first officer said, "oh yeah," then asked for approach flaps. The captain responded with, "speed checked. approach flaps." At 1003:35, the captain told the first officer to "put thirty degrees of bank in there," then, 12 seconds later, said, "thirty degrees of bank to intercept." At 1004:18, the captain stated, "okay it's alive. keep it going," and the first officer responded with, "coming around," and shortly thereafter, asked, "down to what altitude?" The captain responded with, "kay, we'll just intercept that first...."

At 1004:46, the captain stated, "there's the outer marker right there. do you have it?" The first officer responded, "yeah." Then, at 1004:49, the captain stated, "okay, we can go down to twenty three."

At 1004:54, the first officer stated, "the v-o-r doesn't want to...see that?" At 1005:07, he asked, "see the v-o-r?" At 1005:12, he said, "oh i guess," followed, at 1005:17, by, "the v-o-r's out."

At 1005:18, the captain responded with, "well there's the v-o-r right there," and the first officer answered, at 1005:20, with, "yeah, but it's all over the place."

At 1005:22, the captain stated, "let's get deflection...," and at 1005:25, the first officer stated, "going down to twenty three."

At 1005:28, a sound of static began on the CVR. It ended at 1005:30.

At 1010:06, the tower controller radioed the crew for the airplane's position, then tried again, 23 seconds later. When no reply was heard, the tower controller contacted a number of aircraft, as well as other air traffic control facilities, in an attempt to communicate with the airplane.

On the morning of November 11, 1999, the wreckage was discovered on private property by a forester. He reported the discovery to the owner of the property, who in turn, notified a brother of one of the pilots. The following day, the property owner and the forester escorted the brother, and a friend of the brother, to the site. Later that afternoon, they informed New Hampshire Fish and Game Department officials of the discovery.

The accident occurred during the hours of daylight, and the wreckage was located at 43 degrees, 49.56 minutes north latitude, 72 degrees, 00.75 minutes west longitude.

CREW INFORMATION

The captain held an airline transport pilot certificate with a rating for airplane multiengine land, commercial certificate with a rating for airplane single engine land, and was a certificated flight instructor with ratings for airplane single and multiengine land, and instrument airplane. He was also type-rated in the Learjet. His most recent Federal Aviation Administration (FAA) first class medical certificate was issued on November 1, 1996, with no limitations.

According to company records, as of December 21, 1996, the captain had 4,250 flight hours, of which, 3,658 were as pilot in command, 1,820 were in multiengine airplanes, and 832 were in turbojets. He also had 186 hours of actual instrument time, and 25 hours of simulated instrument time. His last flight prior to the accident flight was on December 21, 1996, when he flew 9.7 hours in the accident airplane.

According to FAA records, the captain received his private pilot certification, single engine land airplanes, on March 16, 1990. On May 4, 1990, he failed the flight, oral and practical portions of his examination for an instrument rating, and was notified he would be reexamined in "all pilot operations." On May 11, 1990, he successfully completed the reexamination for his instrument rating. On June 29, 1990, he failed the flight portion for his commercial certificate; "pilot operations 4,5,6,9 [and] lazy eights were unsatisfactory." On June 30, 1990, he successfully completed his reexamination, and was issued a commercial certificate for single engine land airplanes and instrument-airplane.

On September 12, 1990, the captain failed the practical portion for a certified flight instructor (CFI) certification, but then passed his reexamination, and received his CFI certification on October 25, 1990. On January 5, 1992, he successfully completed the requirements for an airplane multiengine land rating. On August 19, 1994, the captain failed the practical portion for his examination for his airline transport pilot rating. Areas for reexamination were: "Powerplant Failure-Multiengine Aircraft," "ILS/MLS Instrument Approach Procedures," and "Landing in Sequence from an ILS/MLS Approach." On August 20, 1994, the captain successfully passed his reexamination, and was issued an airline transport pilot rating for multiengine land airplanes. On November 29, 1996, he was issued a Learjet type rating.

Company training records indicated that the captain received "PIC/Initial New Hire" training for the Piper PA-31-310 in July 1995. He also received "Initial Equipment" training in the Learjet 35 at that time. Among the training provided, he received "crew resources

management." He also received "differences" training in August 1995 for the Learjet 20-30 and the Piper PA-31-310. He was approved for second-in-command duties in the Learjet 35 on August 14, 1995. The captain also received "Part 135" training in the Learjet 35/36 at Flight Safety International, and a "FAR 135.293" second-in-command check on October 25, 1995. He successfully completed upgrade training for pilot in command, in the Learjet 35A, in November 1996, and successfully completed a "FAR Part 135" airman competency/proficiency check with an FAA inspector on November 29, 1996. On December 7, 1996, the captain was designated by the company as its chief pilot.

According to additional company records provided to the Safety Board, in December 1996, the captain flew 13 flights in the accident airplane. The additional information listed the captain as pilot in command during 11 of those flights. During 7 of those 11 flights, the captain flew as pilot in command with the airplane's part-owner, and on 1 of those flights, he flew with the company's former chief pilot. The accident flight was the only one in the accident airplane, in which the captain and the accident-flight first officer flew together.

The first officer held an airline transport pilot certificate with a rating for airplane - multiengine land, a commercial certificate with a rating for airplane - single engine land, and was a certificated flight instructor with a rating for airplane - single engine land. His most recent FAA first class medical certificate was issued on August 8, 1996, with no limitations. According to company records, as of December 23, 1996, the first officer had 2,067 total flight hours, of which, 1,582 were as pilot in command, 997 were in multiengine airplanes, and 268 were in turbojets. He also had 120 hours of actual instrument time, and 25 hours of simulated instrument time. His last flight before the accident flight was on December 23, 1996, when he flew 0.8 hours in the accident airplane.

According to FAA records, on February 8, 1990, the first officer received his private pilot certification in single engine land airplanes. On January 17, 1991, the first officer failed the flight portion of his instrument rating examination. The disapproval stated that he would be reexamined on "pilot operations 2, area departure and holding." On January 22, 1991, he successfully completed the reexamination for his instrument rating. On June 19, 1991, he successfully completed his commercial pilot certification for single engine airplanes and instrument-airplane. On June 21, 1991, the first officer failed the oral portion for his multi-engine rating. On June 23, 1991, he successfully completed the examination for that rating.

On August 29, 1992, the first officer failed the practical examination for certified flight instructor (CFI). On October 24, 1992, he failed practical test once again, with the same examiner. On April 9, 1993, he passed the test, and was issued a CFI certificate. On October 19, 1995, the first officer failed his initial practical test evaluation for airline transport pilot certification. The inspector who gave him the test stated that the pilot was 30 degrees off course heading inbound on an NDB approach, then "decided to set the DG [directional gyro] to the inbound course heading." On the disapproval, the inspector wrote that the reexamination would be on NDB approach and single engine approach; all other areas satisfactory. On October 21, 1995, the first officer passed the reexamination.

Company training records indicated that the first officer received initial company training in February 1996, for the Beech BE-58. He received initial differences training for the Learjet 25 and Learjet 35 in August 1996. On August 22, 1996, he was "approved" for second-in-command duties, during a "FAR 135 Airman Competency/Proficiency Check."

METEOROLOGICAL INFORMATION

At 1636, the day before the flight, the captain called for a preflight weather briefing, and filed an instrument flight rules flight plan for the airplane from Bridgeport to Lebanon. He also filed a second instrument flight rules flight plan from Lebanon to The Francis S. Gabreski Airport (FOK), Westhampton Beach, New York, and then filed a visual rules flight plan from Gabreski to Bridgeport. At 2037, the evening before the flight, he obtained an outlook weather briefing for the flight, and at 0849, on the day of the accident, he obtained an updated weather briefing for the flight.

Lebanon Municipal Airport was located about 600 feet above sea level. The weather, recorded at 0945, included winds from 190 degrees at 5 knots, an overcast cloud layer at 1,200 feet above ground level (agl), a visibility of 5 statute miles with mist, a temperature 41 degrees Fahrenheit, dewpoint 38 degrees Fahrenheit, altimeter 29.83.

An FAA computer printout, which resulted from the 0849 briefing, had on it, the latest area winds aloft, at 6,000 feet above mean sea level, as being from 220 degrees, in excess of 40 knots. In the briefing audio tapes provided by the FAA, the captain had not requested winds aloft, nor had they been provided.

The captain of a Mesa Airlines flight, which was in holding while waiting for the accident airplane to land, stated that he might have gotten a trace of icing during the holding, at 6,000 feet. He noticed a "strong" tailwind from the southwest at altitude, and was "just in the tops" of the clouds while in holding. He also noticed some breaks in the clouds "through descent to DH."

The captain of a Business Express flight, which was about 5 miles to the south of Lebanon around the time of the accident, also remembered seeing breaks in the cloud layers.

AIDS TO NAVIGATION

The localizer facility for the ILS RWY 18 approach was located just beyond the departure end of that runway. BURGR intersection, which was the initial approach fix for the ILS RWY 18 approach, was directly over a marker beacon. The VOR for the VOR RWY 24 approach was located 066 degrees magnetic, 4.4 nautical miles from the runway. A marker beacon for that approach, co-located with the Hanover NDB, was 066 degrees magnetic, 6.6 nautical miles from the runway.

A chronology of events was provided with an air traffic facilities package from the FAA. The times listed in the chronology were in Greenwich Mean Time (Z). The accident occurred at 1005 Eastern Standard time, which equated to 1505Z. Events included:

On December 25, 1996, at 0055:

"Ground evaluations and certification of Lebanon NH runway 18 LOC, GS. MM, OM VOR/DME, MCR and 125.95 mhz radio equipment is complete. Ground evaluations and certification of Cummington MA ARSR, ATCRB and CD equipment is complete. Evaluation and certification of ARTCC facilities and service at Nashu NH are complete. All facilities were found to be operating satisfactorily."

On December 26, 1996, at 0126:

"LEB VOR/DME failed due to a crushed cable caused by ice buildup in a cable duct."

On December 26, 1996, at 1730:

"FAA flight check completed on Lebanon NH runway 18 LOC, GS, MM, OM and IVV NDB. All were found to be satisfactory. The VOR/DME were not flight checked because the facility was off the air due to the continuing repair activity."

On December 27, 1996:

"Ground evaluation of LAH NDB was conducted. This New Hampshire state operated facility was found to have modulation out of tolerance 66 percent versus 80 to 95 percent. Facility was left as found."

On January 3, 1997:

"Lebanon NH VOR/DME is repaired and ready for flight check."

On January 6, 1997:

"Lebanon NH VOR/DME and LAH NDB were flight checked and found to be satisfactory. Lebanon VOR/DME returned to service, modulation level of LAH NDB was adjusted into tolerance by state technician."

Transmissions between Boston Center and Lebanon Tower included:

At 0952:45, the tower controller reported to the center controller that, "...the learjet is coming back to you, published missed, ah, lost the localizer. we're showing it in the green and i'm going to have a technician go out and check it just in case."

After several other calls, the center controller reported, at 1007:04, "air shuttle fifty three thirty two [Mesa Airlines] is gonna go out and try the i-l-s. he picked it up okay. you still getting a good signal on it?" The tower controller responded with, "ya, we had maintenance check it out and there's no problem, so at least that's what they're saying."

The captain of the Mesa Airlines flight which landed shortly after the accident airplane was lost, stated that there were "no problems with [the] ILS" during his approach.

During the accident captain's first weather briefing, the briefer reported that the Lebanon VOR was out of service. During his final briefing, the captain asked if the VOR was still out of service, and the briefer reported, "i don't even show that one, unless its something's that's published. i don't have anything for lebanon this morning."

AIRCRAFT INFORMATION

According to the operator's records, the airplane had been on a continuous inspection program, with 6,897 total airframe hours. The left engine had 6,767 hours of total time, 1,090 hours since overhaul, and 143 hours since its last inspection. The right engine had 6,897 hours of total time, 1,563 hours since overhaul, and 67 hours since its last inspection.

WRECKAGE AND IMPACT INFORMATION

The wreckage was located approximately 17 nautical miles, 063 degrees magnetic, from Lebanon Municipal Airport. It was on rising terrain, about 2,300 feet above sea level, on the northeastern side of one of the foothills of Smarts Mountain. It was in a forested area, and parts of the wreckage were partially covered with fallen tree debris from an earlier ice storm.

Many trees in the area had been fractured near their tops due to the ice storm. However, a path of sheared trees was found, with a debris trail alongside, that led to main fuselage. The

path began about 360 feet prior to wreckage, and proceeded along a 229-degree magnetic heading, at a varying 3- to 5-degree descent angle. The descent path terminated near the bases of two, 1-foot diameter trees which had been uprooted, and pushed over. The main fuselage was found about 60 feet beyond, and upslope of those trees, with only the right engine still attached.

The front of the main fuselage and a nearby tree exhibited fire damage. The left engine was found to the right of the main wreckage. The cockpit area had been destroyed. The engine instruments that were found indicated a turbine speed of 62.2 percent for the left engine, and 62.1 per cent for the right engine, a fan speed of 41.3 percent for the left engine, and 49.6 per cent for the right engine, and indicated temperatures of 434 degrees for the left engine, and 485 degrees for the right engine. There was no evidence of catastrophic engine failure or fire.

On the left side instrument panel, the HSI was on "MAG", the course selector was on 246 degrees, the heading bug was on 218 degrees, and the indicated heading was approximately 225 degrees. The vertical speed indicator was on zero, the DME was digital, and the remaining instruments were either broken or missing.

On November 17, 1999, after the wreckage had been removed, an individual at the site found the control heads to the VOR navigation system. The individual notified the Safety Board, and reported that the number 1 VOR navigation head was on 113.65 mhz, and the number 2 VOR navigation head was on 113.70 mhz. The individual forwarded the heads to the Board in October 2000. The gearing behind the number 1 head, which selected the frequency, was found to be twisted and out of alignment, and exhibited impact damage.

The accident site was located about 061 degrees magnetic, 12.5 nautical miles from the Lebanon VOR.

ADDITIONAL INFORMATION

---Approach Briefing---

According to the company's operations manual:

"Prior to commencing any approach, all pilots will review all information available relative to the approach, landing, and missed approach procedures. The airspeed at which the final approach will be made shall be specified by the Pilot in Command consistent with existing conditions: gross weight, wind conditions, etc. All pilots should be aware of the approximate rate of descent during the approach, and a descent rate which must necessarily exceed normal parameters should be discussed.

For two-pilot crews during instrument approaches, normally the pilot flying briefs the pilot not flying on data pertinent to the approach, to include at least: final approach course, altitude to the final approach segment, MDA or DH (both radar and barometric, when available), field elevation, missed approach procedures, and any special requirements or conditions. For non-precision instrument approaches without a specified VDP, a "time to see" point should be calculated for straight-in approaches to promote awareness of the position of the aircraft relative to a normal approach angle. If a circling approach in instrument conditions is contemplated, the approach briefing should include the detailed plan for executing the circle. The pilot not flying should add or amend any significant information items that may have been omitted or are erroneous."

---Crew Coordination During Approach - Two-Pilot Crews---

According to the company's operations manual:

"Company S.O.P. (Standard Operating Procedures) will be strictly adhered to on all approaches. It is important for all flight crewmembers to understand the proposed plan of action for all phases of flight, but this shared plan awareness is especially critical in the approach and landing phases. When traffic, weather, or other considerations dictate any deviations from the S.O.P., or necessitate additional crew coordination activities, these items will be thoroughly briefed in the approach briefing.

The overriding considerations during the approach and landing phases are that a stabilized approach will be flown at least during the final approach segment, and that all flight crewmembers are aware of the details of the final approach and missed approach segments. If, for any reason, the aircraft is not configured for a stabilized final approach segment, or flight crewmembers have not sufficiently reviewed all the pertinent information for the approach and missed approach, the crew will request delaying procedures, such as additional turns in a holding pattern or radar vectors back to final, to allow the final approach segment to be initiated in a stabilized and prepared fashion. In addition, if, for any reason, the aircraft cannot continue to be stabilized on the final approach segment, a missed approach will be initiated rather than attempting to 'save' the approach."

---Nonprecision Instrument Approaches---

According to the company's operations manual, nonprecision approaches were flown as follows:

Approaching the initial approach fix (IAF): gear and flaps up, airspeed Vref plus 40 knots, approach checklist complete.

IAF outbound: flaps 8 degrees, airspeed Vref plus 30 knots, descend if required.

On course inbound: flaps 20 degrees, gear down, airspeed Vref plus 20 knots, before landing checklist, complete to flaps 40 degrees.

Final approach fix: flaps 40 degrees, airspeed Vref minimum.

---Area Navigation---

According to the company's FAA-approved operations specifications, the company was authorized to use a Trimble TNL2101 GPS in the accident airplane. However, in the "installation description of work accomplished," there was the statement, "The panel has been placarded 'GPS LIMITED TO VFR USE ONLY'."

According to the manufacturer's equipment list, the airplane was equipped with a Global GNS-500-3A VLF/Omega.

According to air traffic control transmissions, the airplane was initially cleared direct to BURGR intersection, for the ILS RWY 18 approach.

In the flight plan, the airplane's equipment code was listed as "/R". According to the Airman's Information Manual, "/R" signified "RNAV and transponder with altitude encoding capability."

---Distance Measuring Equipment---

According to the manufacturer's equipment list, the airplane was equipped with a Collins DME-40.

Other than when an air traffic controller asked the crew the airplane's distance from the Lebanon VOR, there were no additional discussions of distances on the CVR transcript.

---ADF Operations---

According to the manufacturer's equipment list, the ADF installed on the accident airplane was a Collins ADF-60. Excerpts from the Collins Operations Manual included:

Under general operations: "The ADF-60 system provides aural reception of transmissions from a selected ground station and indicates relative bearing to that station. The ground station must be within the operating range of 190 to 1,749.5 kHz."

Under "Frequency Selection": "Tune the ADF control unit until desired frequency is indicated in control unit display window and verify the station identifier."

Under "ADF Function": "Set ADF control unit function switch to ADF. The RMI pointer will indicate relative bearing to the tuned station. Adjust the volume as required." A note under the same heading stated: "When the ADF-60 system is not receiving a reliable signal, the RMI pointer will remain parked in ADF mode. The ADF-60 may momentarily park during station crossings because of signal loss."

---Navaid Identification---

There were no sounds of navigational aid identification, on the CVR recording.

---Unidentified Clicks---

According to the CVR Group Chairman's Factual Report, the CVR contained audio information on three of the four audio channels. "Unidentified clicks" were recorded only on the cockpit area microphone (CAM) channel.

According to the CVR Specialist's Waveform Study, audio heard on a CVR recording would usually fall into two source categories. One source, would be audio acoustically recorded via the CAM or pilot headset microphone, and normally found on only one CVR channel. The other source would be electrical noise or interference, introduced into, and recorded by the CVR system. Electrically-induced disturbances would normally affect the entire CVR system, and the resulting spikes or noises would be found on more than one CVR channel.

The Study further reported that most acoustic click sounds found on CVR recordings contained characteristics similar to a "classic" impulse response. A classic impulse response was defined as a sound or signal with a short duration that resulted in a spike in amplitude, with an even energy distribution across the entire frequency band. The majority of the clicks found in the accident CVR study were consistent with the characteristics of an acoustic impulse sound.

The Study also noted that the identification of the exact source of an impulse noise, like a click, would not usually be possible.

---Wreckage Release---

On November 13, 1999, the airplane was released to a representative from United States Aviation Underwriters (USAIG), New York, New York.

Pilot Information

Certificate:	Airline Transport	**Age:**	30, Male
Airplane Rating(s):	Multi-engine Land; Single-engine Land	**Seat Occupied:**	Right
Other Aircraft Rating(s):	None	**Restraint Used:**	
Instrument Rating(s):	Airplane	**Second Pilot Present:**	Yes
Instructor Rating(s):	Airplane Single-engine	**Toxicology Performed:**	No
Medical Certification:	Class 1 Valid Medical--no waivers/lim.	**Last FAA Medical Exam:**	11/01/1996
Occupational Pilot:		**Last Flight Review or Equivalent:**	
Flight Time:	4250 hours (Total, all aircraft), 1000 hours (Total, this make and model), 3058 hours (Pilot In Command, all aircraft), 55 hours (Last 30 days, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Learjet	**Registration:**	N388LS
Model/Series:	35A 35A	**Aircraft Category:**	Airplane
Year of Manufacture:		**Amateur Built:**	No
Airworthiness Certificate:	Normal	**Serial Number:**	388
Landing Gear Type:	Retractable - Tricycle	**Seats:**	0
Date/Type of Last Inspection:	11/26/1996, Continuous Airworthiness	**Certified Max Gross Wt.:**	18300 lbs
Time Since Last Inspection:	143 Hours	**Engines:**	2 Turbo Jet
Airframe Total Time:	6897 Hours	**Engine Manufacturer:**	Garrett
ELT:	Not installed	**Engine Model/Series:**	TFE 731
Registered Owner:	AIRLAND LLC	**Rated Power:**	3500 lbs
Operator:	AIRCRAFT CHARTER GROUP, INC.	**Operating Certificate(s) Held:**	On-demand Air Taxi (135)

Meteorological Information and Flight Plan

Conditions at Accident Site:	Instrument Conditions	**Condition of Light:**	Day
Observation Facility, Elevation:	LEB, 600 ft msl	**Distance from Accident Site:**	17 Nautical Miles
Observation Time:	0945 EDT	**Direction from Accident Site:**	243°
Lowest Cloud Condition:	Unknown / 0 ft agl	**Visibility**	5 Miles
Lowest Ceiling:	Overcast / 1200 ft agl	**Visibility (RVR):**	0 ft
Wind Speed/Gusts:	5 knots /	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	190°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	29 inches Hg	**Temperature/Dew Point:**	41°C / 37°C
Precipitation and Obscuration:			
Departure Point:	BRIDGEPORT, CT (BDR)	**Type of Flight Plan Filed:**	IFR
Destination:	LEBANON, NH (LEB)	**Type of Clearance:**	IFR
Departure Time:	0919 EST	**Type of Airspace:**	Class G

Airport Information

Airport:	LEBANON MUNICIPAL AIRPORT (LEB)	**Runway Surface Type:**	Asphalt
Airport Elevation:	600 ft	**Runway Surface Condition:**	
Runway Used:	25	**IFR Approach:**	VOR
Runway Length/Width:	5496 ft / 100 ft	**VFR Approach/Landing:**	None

Wreckage and Impact Information

Crew Injuries:	2 Fatal	**Aircraft Damage:**	Destroyed
Passenger Injuries:	N/A	**Aircraft Fire:**	On-Ground
Ground Injuries:	N/A	**Aircraft Explosion:**	Unknown
Total Injuries:	2 Fatal	**Latitude, Longitude:**	

Administrative Information

Investigator In Charge (IIC):	PAUL R COX	**Report Date:**	12/07/2000
Additional Participating Persons:	TONY JAMES; WASHINGTON, DC JAMES TIDBALL; WICHITA, KS PHIL HENSLEY; PHOENIX, AZ		
Publish Date:			
Investigation Docket:	NTSB accident and incident dockets serve as permanent archival information for the NTSB's investigations. Dockets released prior to June 1, 2009 are publicly available from the NTSB's Record Management Division at pubinq@ntsb.gov, or at 800-877-6799. Dockets released after this date are available at http://dms.ntsb.gov/pubdms/.		